



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN

PROJEK SARJANA MUDA II

Tajuk Projek : PC BASED DEVICE SWITCHING CONTROLLER

Sesi Pengajian : 2007 - 2008

Saya **ANUAR HASZUAD BIN ABD HALIM**

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Fakulti Kejuruteraan Elektronik dan Kejuruteraan Komputer (FKEKK)

Universiti Teknikal Malaysia Melaka (UTeM).


Karung Berkunci 1, 000,

Ayer Keroh, 75450 Melaka

“I hereby declare that this report is the result of my own work except for quotes as cited
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Author : ANUAR HASZUAN B. ABD. HALIM
Date : 7 MAY 2008

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Signature : 

Supervisor's Name : *MARIONA BRIN*

Date : *09/05/2008*

To my beloved mother and father and also my family.....

ACKNOWLEDGEMENT

Alhamdulillah, thanks to Allah, I finally am able to complete my final year project and the thesis as well within the allocated time. First of all, I would like to take these opportunities to express my appreciation to some organizations and individuals who have kindly contributed to the successfully completion of my final year project in UTeM. With the cooperation and contributions from all parties, the objectives of the project; soft-skills, knowledge and experiences were gained accordingly. To begin with, I would like to convey my acknowledgement to our faculty final year project organization members especially my project supervisor, Puan Mardiana Bt Bidin for her cooperation and involvement from the beginning until the end of my project development. Her effort to ensure the successful and comfortability of students under her responsibility was simply undoubtful. Thanks for the invaluable advices given before, while and after completion of the project. Furthermore, I would like to extend my sincere acknowledgement to my parents and family members who have been very supportive throughout the project and giving me the encouragement all the time. Their understanding and support in term of moral and financial were entirely significance towards the project completion. Last but not least, my appreciation goes to my fellow colleagues in UTeM, especially for those who come from FKEKK. Their willingness to help, opinions and suggestion on some matters, advices and technical knowledge are simply precious while doing upon completion of my final year project.

ABSTRACT

PC Based Device Switching Controller is the project which is aims to control the household electrical appliances through the computer by using a configuration of serial port so that user can control their household electrical appliances easily through their personal computer. The system is controlled by the input from the push button in simple Graphical User Interface (GUI) in the MATLAB window. To connect from PC's to the household electrical appliances we will use a Serial Port connector (DB9) and the PIC as the interface circuit. However for the interface circuit itself a simple program have to be create to assign the entire serial port pin as input, output, supply and others so that the PC will understand the function of each pin and execute the user program. PIC functions as the main switch to controls the operation of the electrical appliances. It also will be programmed to allow the component to interact with the input received and the household electrical appliances. At the end of this project, this system will allow users to use and regulate their home electrical goods just by using the input from GUI as the 'remote control'.

ABSTRAK

Alat Kawalan Pensuisan Perkakasan melalui Komputer adalah merupakan satu sistem di mana ianya digunakan untuk mengawal keseluruhan peralatan atau perkakasan elektrik di dalam rumah dengan menggunakan konfigurasi liang sesiri bagi membolehkan para pengguna dapat mengawal keseluruhan peralatan dan perkakasan elektrik di rumah mereka dengan mudah melalui komputer peribadi mereka sendiri. Sistem ini di kawal dengan menggunakan input atau masukan daripada antaramuka pengguna yang dipaparkan pada antaramuka pengguna di dalam tettingkap MATLAB. Untuk menghubungkan antara komputer dengan peralatan dan perkakasan elektrik di dalam rumah, liang ssiri akan digunakan sebagai penghubung dan pengawal antaramuka perkakasan digunakan sebagai litar antaramuka. Walaubagaimanapun litar antaramuka tersebut akan di aturcarakan untuk menentukan setiap fungsi bagi setiap pin pada liang selari bagi membolehkan sistem komputer melaksanakan arahan daripada pengguna. PIC juga berfungsi sebagai suis utama bagi mengawal keseluruhan operasi bagi peralatan dan perkakasan elektrik. Di akhir projek ini, sistem ini akan berupaya untuk mengawal peralatan dan perkakasan elektrik dengan hanya menggunakan masukan pada antaramuka pengguna grafik sebagai alat kawalan jauh.

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LIST OF ABBREVIATIONS

AC	-	Alternate Current
ALU	-	Arithmetic Logic Unit
COP	-	Computer Operating Properly
CPU	-	Central Processing Unit
DC	-	Direct Current
EPROM		Erasable Programmable ROM
EEROM		Electrical Erasable ROM
GND	-	Ground
GUI	-	Graphical User Interface
IC	-	Integrated Circuit
I/O	-	Input Output

LCD	-	Liquid Crystal Display
LED	-	Light Emitter Diode
MCU	-	Microcontroller Unit
PC	-	Personal Computer
PCB	-	Printed Circuit Board
PIC	-	Peripheral Interface Controller
RAM	-	Random Access Memory
RC	-	Resistor Capacitor
ROM	-	Read Only Memory
SRAM	-	Static RAM
USB	-	Universal Serial Bus

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

This chapter will give a basic view of information about the overall system of this project; PC Based Device Switching Controller which is consists of two stages which are software and hardware development where these two main part will be combine together so that it will work and function properly and related with each other. This chapter also will cover about the overview of this project, objectives, scope, project methodology and lastly summary structure of this report will be described in this chapter. Nowadays, technologies has been assimilates into our whole life without we realized it. Besides that, these technologies have good and bad impacts depend on how we use and manage it.

1.2 PROJECT OVERVIEW

This project aims to control the household electrical appliances using simple GUI through the computer so that user can control their household electrical appliances easily through their personal computer. This project is the renovation from the current system where the remote control has been used to manage their household electrical appliances. Besides that, by inventing this project it can help the disable people like blind, weak and old folk which are not able to handle their own self can undergo their routine easier.

This project has divided to two main part or categories which are software development consist a recognition system and hardware development consist serial port, voltage regulator circuit and interface circuit as a main component that control overall electrical appliances. In the interface circuit there are microcontroller will be use to be a central processing unit. Depending on various manufactures, microcontroller is divided into several categories depend on their data bus size i.e. 8-bit, 16-bit, 32-bit etc. For this project it will use 8-bit microcontroller manufactured by Microchip which is PIC16F84.

For the hardware part, PIC will be use as a converter to convert an analog signal to a digital signal. It also functions as switches where it will control the operation of household electrical appliances. As the output, all the electrical appliances will be operating depend on the voice command from the user.

According to the usage of computer system nowadays, it make microelectronic and integrated circuit technology have been more valuable and greater so that it become the most needed or demanding technology around the world today. The microelectronic technology that has be mentioned is refer to the PIC which was invented to be a brain in the chips. Because of the voice recognition circuit have their own specifications and need to be fulfill so the PIC is the most suitable component to be use in this project compare to others. By using the PIC, it also can simplify the complex circuit and other component connection and then reduced the project cost.

1.3 OBJECTIVES

As mentioned in the project overview, this project aims to control the household electrical appliances using voice command through the computer so that user can control their household electrical appliances easily through their personal computer. For this project it will cover four main objectives as a target to be achieved which are:-

- ◆ To design a prototype circuit of the household electrical appliances.
- ◆ To design and build the interfacing circuit and understand its functionality and make it connected to household electrical appliances and personal computer.
- ◆ To create a simple Graphical User Interface (GUI) for user usage by using MATLAB programming.
- ◆ To monitor and analyze the project performance.

For this project application, it will use a prototype circuit of the household electrical appliances to consider as an output. Regarding to the project level as a final year project, the real wiring system of the household electrical appliances will not be built but the prototype circuit will be used to observe the output and its functionality. For the hardware development, as a project progresses the interface circuit will be designed and built and it consists of three main components which are PIC, MAX232 and voltage regulator. However, before proceeding to build the circuit we need to understand how it will work and its specification to avoid any problem occurring in the next procedure and stages.

This project also consists of a simple GUI for user usage where it will be developed using MATLAB programming. MATLAB has been chosen because the program has a higher compatibility and is user friendly and makes it easier for any user. This project's performance will be the last objective to be achieved where its performance will be monitored and analyzed for their improvement and weaknesses so that it can be upgraded in the future.

1.4 PROBLEM STATEMENT

In the past, in the present and in the future all household electrical appliances still will be the most needed things of all the people around the world to fulfill their more comfortable life. Nowadays people have to make a movement to the switches to switch on or switch off their electrical appliances although some of them are too weak or too old to make the activities. Besides, all the switches are not at the same places. For example all the electrical appliances in the kitchen, their switches surely around the kitchen and also for dining hall electrical appliances, bedroom, toilet and so on.

By inverting this project, hopefully it will make all people around me to manage their time and energy more effective and efficient. So that it can make human lifestyle become more simple and easier. The more important of this project is to use of smart home device a set of intelligence home appliances that can provide users with better home life without overpowering them with complex technologies and intuitive user interfaces.

1.5 SCOPES OF PROJECT

When producing any type of project either small or mega project, they have their own scope to show their performance or achievement compare with the others. This project will focus more on hardware development especially in interface circuit and the prototype of the household electrical appliances. And then we will develop a simple program using MATLAB as the user interface (GUI). However MATLAB cannot communicate directly to serial port so between this two part Visual Basic have to use to be the interconnection.

For the interface circuit we have use PIC and serial port to interfacing with the computer and the user. PIC is used as a microcontroller to control a communication between computer and household electrical appliances. The type of PIC that we will use is PIC16F84A, the basic of microcontroller model. So for the simulation we also use PIC16F84 because it is easier to connect with other component and less connection pin which is 18 pin compare to PIC16F877 which have 40 pin. In this project we have assign port B as an inputs and port A as an outputs. Switches will connect to the port B represented as the input signal. And then the LED as outputs indicator are connect to port A.

Besides, DB9 serial port male and female type will be use as a connector between personal computer and the interface circuit. However this connector has their pin configuration and should be in the correct connection to make sure the communication process can be function and works properly. There are 3 important pin will be use for the serial port which are pin 2 and 3 of female connector will connect to MAX232 as transmitter and receiver pin and then pin 5 to ground. For the connection between the serial port and PIC, the MAX232 is used to be a driver for DB9 to make sure the microcontroller (PIC) recognize the connector and then understand the input from the computer through the connector.

For the household electrical appliances, just the prototype circuit will be use in this project where we will connect the output from PIC and connect with output component such as bulb and DC motor in the prototype circuit; just for the observation.

Beside that we also will use MATLAB software as the interface between user and the system. We have create a simple Graphical User Interface using MATLAB where there are 4 input button as a selector to select which output that user want to use.

1.6 REPORT STRUCTURE

This report contains five chapters that will cover an explanation about this project. Chapter one is an introduction of this project. It will give basic information about the project including a synopsis or overview of the project, objectives of the project, the scopes and the problem statement.

The second chapter will discuss about the literature reviews of the project. The literature reviews includes the study of the components in the project such as Peripheral Interface Controller (PIC), DB25 connector, MAX232, SourceBoost programming and Proteus 6 Professional (ISIS 6 Professional). Most of the data and information are getting from articles or journal in web page and from the text book. All data and information that have been collect will be discussed to identify and select the best method and component for this project. This chapter will show the theory of each aspect of the projects. Show that, the theory of the components will be understood through the literature review process.

For the third chapter it will explain about the methodology of the project. It will show the flow and step while completing this project. All the process of the methodology will be represent in a flowchart where we can see the entire process in their sequential.

The fourth chapter for this report will cover about the project development and project result including the preliminary result of the project and final result. . It will show the simulation result for the interface which is consists of PIC, MAX 232 and voltage regulator and the result from the part of hardware development. And then we will include the discussion about this project at the last of this chapter.

In the final chapter it will include with conclusion and suggestion for this project. Here we will discuss about the result of FYP Seminar I about the suggestion and problem observed by the panel and then the action taken from the feedback given by the panel.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter will discuss about the theory and the concept of overall project. The component that use in this project also will be discuss in this chapter. The purpose of this discussion is to explain the perspective and the method used in the past research and how far this project related with other project with same concept nowadays. Besides, this chapter also will cover about the theory of problem solution for this project. Theoretical understanding is important as a reference in any research development and implementation.